

Natural Resources Conservation Service
Conservation Practice Standard

SALINITY AND SODIC SOIL MANAGEMENT

(ACRE)

CODE 610

DEFINITION

Management of land, water and plants to control and minimize accumulations of salts and/or sodium on the soil surface and in the crop rooting zone.

PURPOSE

- To reduce and control harmful salt concentrations in the root zone
- To reduce problems of crusting, permeability or soil structure sodium affected soils
- To promote desired plant growth and to utilize excess water in the root zone in non-irrigated saline seep areas and their recharge areas.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where the concentration or toxicity of salt limits the growth of desirable plants or where excess sodium causes surface crusting and slow permeability problems. This practice also applies to non-irrigated land where a combination of factors such as topography, soils, geology, precipitation, vegetation, land use and cultural/structural practices can increase the extent and concentration of salts in saline seep areas.

CRITERIA

General Criteria Applicable to All Purposes.

All work, including associated practices for management of drainage, decommissioning of wells and runoff, shall comply with Federal, State, and local water quality laws and regulations (see [FOTG, Section I, State and Local Laws, Ordinances, and Regulations](#)).

Improve surface and subsurface drainage as needed to reduce localized ponding and or high water tables.

Treatment of saline seeps includes the identification of discharge and recharge areas, as well as the implementation of management practices to correct and improve soil conditions of the seep area.

The type and application rate of soil amendments will be based on the chemistry of the soil and available irrigation water (where applicable). Lab analysis will be used to determine the concentrations and types of salts and/or sodium (dS (EC), sodium adsorption ratio (SAR or RNA), exchangeable sodium percentage (ESP) and pH.

Additional Criteria to Reduce Salt Concentrations in the Root Zone

On irrigated lands, leaching requirements shall be determined as presented in National Engineering Handbook Part 623, Chapter 2, Examples 2-22.

Irrigation systems with proper irrigation water management will highly enhance the reclamation of saline/sodic areas.

On non-irrigated land, reclamation shall

utilize vegetative methods, soil amendments (chemical and organic), and/or enhanced drainage to effect a reduction in soil salinity. [See National Range and Pasture Handbook, Chapter 3 600.0314.](#)

Additional Criteria to Reduce Problems of Crusting, Permeability or Soil Structure Sodium-affected Soils.

There is no single treatment method that is appropriate in all situations. And, not every problem area can be economically treated. Only after an evaluation and assessment of the problem area can a suitable recommendation be made.

Samples of both soil and available irrigation water (if applicable) should be sent to a certified testing laboratory for chemical analysis. The lab will provide a summary of chemical properties and also a recommended treatment. A soil scientist and an agronomist should also be consulted for their knowledge of soils and the problem area.

Increasing organic matter levels by continuous cropping, minimizing tillage, establishing tolerant plant species and removing excess water is more sustainable than adding soil amendments.

Additional Criteria Specific to Saline Seeps and Their Recharge Areas

Plant and/or maintain adapted high water use vegetation in recharge areas to utilize soil water.

CONSIDERATIONS

Soil salinity levels can be monitored to minimize the effects of salinity on crops and to evaluate management practices.

Tools such as electromagnetic induction (EMI) and salinity probes are appropriate for evaluating and for monitoring soil salinity levels.

The drainage water from this practice may have high levels of salts. Select an outlet or disposal area that will minimize the effects of this saline water.

Determine the relationship of ground surface topography and the water table contours in and adjacent to the problem area. One suggested method involves installing nine (three rows of three) auger hole observation wells for water table measurements. Additional wells may be needed to adequately define the recharge area. Timely monitoring of the wells is necessary.

Removal of salts from the root zone by leaching operations may increase contamination of water tables. Avoid excessive leaching and schedule leaching operations during seasons when potential contaminants in the soil profile, such as nitrogen, are low.

For irrigated conditions, an irrigation water management plan should minimize non-point pollution of surface and groundwater resources. Care should be taken when saline water is discharged into drainage ways.

Snow management is usually a necessary component in soil moisture management. It increases the success of a more intense cropping system in a recharge area. Additional moisture from snow and more even distribution of the moisture are gained by leaving stubble stand over winter, no-till cropping systems, or by herbaceous barriers. Attention should be taken to see if this practice is aggravating the discharge area.

Chiseling and sub-soiling can improve permeability, root penetration and aeration where water movement is restricted by contrasting soil horizons. Avoid inversion tillage that can bring salinity to the surface and interrupt the leaching process.

Green manure crops or applications of

organic matter can improve soil structure and permeability. Using high water use and salt-tolerant crops and maintaining permanent vegetation in saline, sodic, or saline-sodic conditions helps keep the water from percolating to the surface.

Polyacrylamides may improve effectiveness of leaching and reclamation of some soils.

Consider practices such as Windbreaks (380), Herbaceous Wind Barriers (422) to store water in areas other than the recharge area or to limit snow accumulation on recharge area.

Water of slight to moderate salinity without high amounts of sodium can enhance leaching of salts.

Residue management will improve the organic matter content of the soil, improve infiltration and minimize surface evaporation and capillary rise of salts to the soil surface.

Consider selecting crops with tolerance to salinity/ sodium levels in the soil. Some other contaminants may be present besides salts such as selenium, nitrates, phosphates or sulfates.

Consider using bedding and planting methods designed to reduce salinity near plant root zone, especially for germinating seeds.

PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice shall be prepared for each field or treatment unit according to the Criteria, Considerations, and Operation and Maintenance described in this standard. Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

Mowing or harvesting biomass (grazing, swathing) is necessary to impact water use by maintaining a vigorous crop.

The recharge area will be maintained in the designed land treatment cover until such time as the discharge area has been reclaimed or otherwise meets the objectives of the producer.

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